Tillbridge Solar

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PEI Report Volume I Chapter 4: Alternatives and Design Evolution

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4. Alternatives and Design Evolution

4.1 Introduction

4.1.1 This chapter of the Preliminary Environmental Information (PEI) Report describes the consideration of alternatives and the design evolution in relation to the Scheme at this preliminary stage.

4.1.2 Schedule 4 (information for inclusion in environmental statements) paragraph (2) of the EIA Regulations (Ref. 4-1) requires: "*A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*" to be presented in the Environmental Statement.

4.1.3 There is no general requirement in relevant national policy to consider alternatives. Overarching National Policy Statement for Energy EN-1 (NPS EN-1) (Ref. 4-2) paragraph 4.4.1 and draft NPS EN-1 (Ref. 4-3) paragraph 4.2.9 states that "*as in any planning case, the relevance or otherwise to the decision-making process of the existence (or alleged existence) of alternatives to a proposed development is in the first instance a matter of law. This NPS does not contain any general requirement to consider alternatives or to establish whether the proposed project represents the best option from a policy perspective. Although there are specific requirement in relation to compulsory acquisition and HRA sites*".

4.1.4 Paragraph 4.4.2 of NPS EN-1 (Ref. 4-2) highlights that in addition to the requirement under the EIA Regulations set out above there are other specific legislative requirements and policy circumstances which require the consideration of alternatives.

4.1.5 These include a requirement under the Habitats Directive, as transposed into UK law by the Conservation of Habitats and Species Regulations 2017, and also in relation to biodiversity and geological conservation interests; flood risk; and development within national designated landscapes which is set out in sections 5.3, 5.7 and 5.9 of NPS EN-1 (Ref. 4-2). Paragraph 4.4.3 of NPS EN-1 (Ref. 4-2) states *"where there is a policy or legal requirement to consider alternatives the applicant should describe the alternatives considered in compliance with these requirements"*

4.1.6 Paragraph 4.2.21 of Draft NPS EN-1 states that "*Given the level and urgency of need for new energy infrastructure, the Secretary of State should, subject to any relevant legal requirements (e.g. under the Habitats Regulations) which indicate otherwise, be guided by the following principles when deciding what weight should be given to alternatives:*

- *the consideration of alternatives in order to comply with policy requirements should be carried out in a proportionate manner*

- *only alternatives that can meet the objectives of the proposed development need to be considered*"

4.1.7 At this preliminary stage, it is not anticipated that the requirement to consider alternatives under these policies is required. It is not anticipated that likely significant adverse effects in relation to biodiversity or geological conservation sites would be experienced. The majority of the Site is situated within an area of low risk of flooding from any source. A sequential approach has been applied to the layout and design of the Scheme to date to avoid permanent development in the small areas of higher flood risk. The Battery and Energy Storage System (BESS) and the substations are also proposed to be located in areas with the lowest risk of flooding. The Scheme is also not located within or in close proximity to any nationally designated landscapes.

4.1.8 Notwithstanding this, draft NPS EN-1 paragraph 4.2.15 states that "*Applicants are obliged to include in their ES, information about the reasonable alternatives they have studied. This should include an indication of the main reasons for the applicant's choice, taking into account the environmental, social and economic effects and including, where relevant, technical and commercial feasibility..*"

4.1.9 PINS Advice Note 7 (Ref. 4-4) provides that a good ES "*explains the reasonable alternatives considered and the reasons for the chosen option taking into account the effects of the Proposed Development on the environment".*

4.1.10 This preliminary chapter therefore presents a summary of the main alternatives considered by the Applicant including consideration of site suitability in the context of Draft NPS EN-3.

4.1.11 The following alternatives have been considered for the Scheme:

- Alternative solar design technical specifications;
- Alternative designs and layouts; and
- Alternative cable route corridors.

4.1.12 Paragraph 4.4.3 of NPS EN-1 states that "*alternative proposals which mean the necessary development could not proceed, for example because the alternative proposals are not commercially viable or alternative proposals for sites would not be physically suitable, can be excluded on the grounds that they are not important and relevant to the IPC's decision*". Therefore a 'no development' scenario is not considered to be a reasonable alternative to the Scheme as it would not deliver the additional renewable electricity generation and storage proposed. Therefore a 'no development' scenario has not been considered further within this PEI Report and will not be considered within the ES.

4.1.13 Draft NPS EN-3 (Ref. 4-5) sets out factors influencing site location including the consideration of capacity. As per paragraph 3.10.52, "*for a solar farm generate electricity efficiently the panel array spacing should seek to maximise the potential power output of the site".* A 'smaller development' as an alternative to the Scheme has also not been considered further, as NPS EN-

1 at paragraph 4.4.3 states that the decision maker: *"…should be guided in considering alternative proposals by whether there is a realistic prospect of the alternative delivering the same infrastructure capacity (including energy security and climate change benefits) in the same timescale as the proposed development".* A smaller scheme would not deliver the same generation capacity or energy security and climate change benefit as the Scheme, and as such would not represent a reasonable alternative.

4.2 Need for the Scheme

4.2.1 The principal objective of the Scheme is to generate low-carbon electricity for an anticipated operational period of approximately 40-60 years. The need for the Scheme is centred on the significant contribution it will make to the three important national energy policy aims of:

- Decarbonisation – achieving Net Zero carbon emissions by 2050, requiring deployment of zero-carbon electricity generation at scale. The Scheme will generate large-scale low carbon electricity which could be operational by 2027.
- Security of supply – geographically and technologically diverse supplies. The Scheme will contribute to security of supply due to its large scale; predictable output; ability to complement other renewables; and the efficient opportunity to integrate BESS.
- Affordability - The Scheme will provide large scale generation at low cost which will provide value for money for end-use consumers.

4.2.2 A detailed Statement of Need will accompany the Development Consent Order (DCO) application however the following paragraphs provide a summary in the context of government policy on energy.

4.2.3 The need for the Scheme arises in response to the Government's strategy to deliver the UK's legally binding net zero obligations, which requires the delivery of new infrastructure to support meeting those obligations. The Ten Point Plan for a Green Industrial Revolution (November 2020) (The Ten Point Plan) (Ref. 4-6), The Net Zero Strategy: Build Back Greener (October 2021)(Ref. 4-7), and the British Energy Security Strategy (April 2022) (Ref. 4-8) together set out the Government's strategy to decarbonise industry in line with the plan for achieving the UK's legally binding net zero obligations by 2050.

4.2.4 The Government has detailed policies for how this would be achieved through the deployment of a combination of different technologies and measures. This includes a five-fold increase in expected deployment of solar energy generation by 2035 as reported in the British Energy Security Strategy (April 2022) (Ref. 4-8).

Need to provide energy capacity to meet net zero obligations by decarbonisation

4.2.5 The UK is legally bound through the Climate Change Act (2008) (CCA2008) (Ref. 4-9), to reduce carbon emissions. The CCA2008 is underpinned by further legislation and policy measures which have developed in the last 13

years. This has been based on an increased need and urgency for decarbonisation in order to meet the UK's obligations under the Paris Agreement (2015) (Ref. 4-10).

4.2.6 In May 2019, the Government's independent expert Climate Change Committee (CCC) published 'Net-Zero: The UK's contribution to stopping global warming' (Ref. 4-11). This report recommended that the UK Government extend the ambition of The Climate Change Act (2008) and that "*The UK should set and vigorously pursue an ambitious target to reduce greenhouse gas emissions (GHGs) to 'Net-Zero' by 2050, ending the UK's contribution to global warming within 30 years*." In June 2019, the Government announced the Climate Change Act 2008 (2050 Target Amendment) Order 2019 amending the Climate Change Act 2008, to implement the CCC's recommendation into law, and the UK became the first major economy to pass laws to end its contribution to global warming by 2050.

4.2.7 The Energy White Paper 'Powering our Net Zero Future' (December 2020) (Ref. 4-13) seeks to transform the energy sector recognising that the necessity of tackling climate change offers huge opportunity for both growth and job creation. The White Paper sets out the Government's long term strategic vision to transition to clean energy and meet net zero by 2050 and emphasises that "*simply setting the target is not enough, we need to achieve it".* The Energy White Paper recognises that achieving the goal of net zero by 2050 will require a future energy generation mix that is "*likely to be composed predominantly of wind and solar".* Solar is therefore a key part of the government's strategy for low-cost decarbonisation of the energy sector and ensure security, reliability and affordability of energy supply.

4.2.8 Draft NPS EN-1 outlines the policy context for the development of nationally significant energy infrastructure to support the vision set out in the Energy White Paper. Paragraph 2.3.3 states that the objective for the energy system is to "*ensure our supply of energy always remains secure, reliable, affordable, and consistent with meeting our target to cut GHG emissions to net zero by 2050…This will require a step change in the decarbonisation of our energy system*". Schemes with the proven ability to achieve savings in this decade must be consented and it is these Schemes which are most critical to keeping the UK on its carbon reduction path.

4.2.9 Draft NPS EN-1 provides that a "*secure, reliable, affordable, net zero consistent system in 2050 is likely to be composed predominantly of wind and solar"*. Draft NPS EN-3 on renewable energy furthermore recognises the need for 'sustained growth' in solar capacity to meet net zero emissions by 2050.

Need for Energy Security

4.2.10 The British Energy Security Strategy (Ref. 4-8) addresses the UK's vulnerability to international energy prices and highlights the importance of reducing the UK's dependence on imported oil and gas. An increasing demand for electricity and an increasing reliance on generation from renewable sources brings with it new challenges in terms of security of supply, i.e. 'keeping the lights on'.

4.2.11 The UK already benefits from substantial renewable energy resources, including 40% of Europe's wind resource and areas of developable land which receive high levels of solar irradiation. Wind and solar are also mutually compatible technologies due to the climatic conditions which they rely on. Solar generation can efficiently make up the shortfall of required generation capacity from wind in the summer months without delivering significant over-generation in winter periods, as would be the case should wind power seek to make up the seasonal shortfall.

4.2.12 With regards to energy security, NPS EN-1 highlights how critical it is that the UK continues to have secure and reliable supplies of energy to make the transition to a low carbon economy.

4.2.13 The inclusion of electricity storage by providing a BESS enhances the utility of the power generated by the Scheme by providing energy balancing capability and other services to support a more efficient and effective as well as a more reliable and less costly operation of the National Electricity Transmission System. This provides much needed flexibility to the electricity network to manage demand.

Need for Large Scale Solar to deliver low cost energy

4.2.14 The cost of solar generation is already very competitive against the cost of other forms of conventional and low-carbon generation, both in Great Britain and more widely. Single large-scale solar schemes deliver more quickly and at a lower unit cost than multiple independent schemes which make up the same total capacity, bringing forward carbon reduction and economic benefits in line with government policy. Increased scale and size provides increased decarbonisation benefits and commercial benefits to consumers.

4.2.15 Solar generation such as the Scheme can be provided at a large scale for a relatively low cost which, in relation to other electricity generation infrastructure developments, provides value for money for end-use consumers.

4.2.16 NPS EN-1 (Ref. 4-2) Paragraph 3.3.1 of NPS EN-1 states that "*electricity meets a significant proportion of our overall energy needs and our reliance on it is likely to increase as we move towards our 2050 goals*". It continues that '*there is an urgent need for new (and particularly low carbon) energy NSIPs to be brought forward as soon as possible and certainly in the next 10 to 15 years"* (paragraph 3.3.15).

4.2.17 A diverse renewable generation fleet (i.e. consisting of many different technologies) in the UK will play an important role in the resilience of the UK's electricity system from an adequacy and system operation perspective. Diversity improves the resilience of low-carbon supplies against the uncertainty of when they will be generated. Draft NPS EN-1 (Ref. 4-3) provides that solar along with wind is expected to be the main form of electricity generation helping to reduce costs and provide clean and secure sources of electricity supply (paragraph 3.3.20).

4.2.18 Estimates by the National Grid Electricity System Operator (NGESO), National Grid Infrastructure Commission (NIC) and Energy Systems Catapult (ESC) of the capabilities of new solar generation needed in order to meet Net Zero

include 44 to 76 GW of additional solar capacity by 2050, with approximately one quarter of this needed in the next ten years.

4.2.19 The Scheme would support the Governments current and emerging energy policy on renewable energy (Draft NPS-EN3) which recognises the need for 'sustained growth' in solar capacity to meet net zero emissions by 2050. The Scheme's objective is to generate low-carbon electricity for an operational period of approximately 40-60 years.

4.3 Site Suitability for Solar

4.3.1 As set out in draft NPS EN-3 (Ref. 4-5) there are a number of factors affecting the location and layout of sites and this section sets out the considerations made in determining the location of the Principal Site within the Scheme.

4.3.2 There is no standard methodology for the site selection of solar energy farms. Draft NPS EN-3 (Ref. 4-5) sets out the key considerations which influence the location of a solar farm including:

- Irradiance and site topography;
- Proximity to residential dwellings;
- Agricultural land classification and land type;
- Accessibility
- Public Rights of Way
- Security and Lighting and
- Network Connection.

4.3.3 It is these considerations which have informed the location of the Scheme as set out in the following paragraphs. An initial area of search was established surrounding a Point of Connection at National Grid Cottam Substation. The topography within the east of England offers both high levels of irradiation and large flat open areas which are key considerations to ensure maximum energy generation.

4.3.4 As set out on NPS EN-1 paragraph 4.9.1 (Ref. 4-2) the connection of an energy generation plant to the network is an important consideration. It identifies that *'it is for the applicant to ensure that there will be necessary infrastructure and capacity within an existing or planned transmission or distribution network to accommodate the electricity generated'.* Cottam Power Station ceased generation on the 30 September 2019, however an existing National Grid substation is located close to the Principal Site for which the client has an agreement to connect to.

4.3.5 With an increased distance from the point of connection, the transmission of electricity to the grid becomes less efficient and the connection becomes considerably more costly. Therefore, an initial area of search of 15km from the POC at National Grid Cottam Substation was considered as part of a desk-based assessment.

4.3.6 The planning and environmental spatial constraints were mapped using desktop research (informed by national and local planning policy). This included consideration of international, national and local designations for ecology and landscape (for example, Areas of Great Landscape Value, Ancient Woodland, Sites of Special Scientific Interest), designated Heritage Assets, conservation areas, flood risk, Agricultural Land Classification (ALC) and Urban Areas including appropriate buffers to respond to potential residential amenity impacts. Areas of land covered by these constraints would be less suitable for solar development.

4.3.7 With regard to land use and agriculture land, paragraph 3.10.14 states that "*While land type should not be a predominating factor in determining the suitability of the site location applicants should, where possible, utilise previously developed land, brownfield land, contaminated land and industrial land. Where the proposed use of any agricultural land has been shown to be necessary, poorer quality land should be preferred to higher quality land (avoiding the use of "Best and Most Versatile" agricultural land where possible).*"

4.3.8 As set out in draft NPS EN-3 topography is a key consideration in terms of the operational viability of a solar farm and the flatter the land the better to reduce any potential shading between panels. Therefore the topography was mapped to identify all land which is below a 2% gradient to identify the flattest areas of land.

4.3.9 Draft NPS EN-3 states that "*in order for a solar farm to generate electricity efficiently The panel array spacing should seek to maximise the potential power output of the site"*. (paragraph 3.10.52). As such large areas of contiguous land were sought. In order to deliver a power output of between 650 and 1,000 megawatts (MW) a minimum site area of 930ha and a maximum site area of 1,700 hectares was considered.

4.3.10 Paragraph 5.10.3 of NPS EN-1 states that the re-use of previously developed land for new development can make a major contribution to sustainable development by reducing the amount of countryside and undeveloped greenfield land that needs to be used. Paragraph 117 of the NPPF expects planning decisions and policies to promote the effective use of land.

4.3.11 The brownfield land register for each of the local planning authorities was reviewed and all sites within the search area were considered. The brownfield land review did not identify any brownfield land of the size required by the proposed Scheme. All the brownfield land identified within the area of search were less than 5ha or already allocated within emerging local policy.

4.3.12 Taking the above key considerations as set out in draft NPS EN-3, an area of land to the east and south-east of Gainsborough extending to some 2,700 hectares was identified for further consideration for the location of the Scheme as it offered:

- Large flat areas of land to enable high levels of irradiation and reduce shading between arrays.

- Point of Connection capacity – whilst Cottam Power Station ceased operation in 2019 the existing National Grid Cottam Substation is still operational.
- Maximises the utilisation of lower grade, non best and most versatile agricultural land.
- Is not located within internationally and nationally designated biodiversity sites and avoids direct impact on locally designated biodiversity sites.
- Is not located within or close to Areas of Outstanding Natural Beauty or designated areas of local landscape value.
- Is not located within designated Green Belt.
- Avoids direct physical impact on designated heritage assets.
- Is predominantly within Flood Zone 1 and at low risk of flooding.
- Has good transport access for construction, being adjacent to the primary route network (A631).
- Is of a size and has topography which meets the requirements of the Scheme to generate and store significant amounts of electricity.
- Has limited land use conflicts with respect to local development plan allocations and the displacement of existing businesses.

4.3.13 Subsequent walkover surveys were then undertaken to identify sensitive parts of this area. This included consideration of landscape and visual aspects, including an assessment of important views, open views and high, medium and lower risk areas for further consideration for the siting of the Scheme. The 2,700 hectare site was then refined and reduced through a master planning exercise reducing the gross development area down to approximately 1,400 hectares. The reduction in area has resulted in the Principal Site being located within lower risk areas with:

- Reduced landscape and visual constraints.
- Consideration of sensitive receptors.
- Retention of existing woodland and hedgerows where possible.
- Utilising existing farm tracks where possible for site access.
- Setting the Scheme away from designated heritage assets (statutory listed buildings and conservation areas).
- Not resulting in the closure or diversion of definitive Public Rights of Way (PRoW).
- Consideration of flood risk.

4.3.14 **PEI Report Volume III Figure 12-1** shows the results of this walk-over and desk-based exercise to refine the site area of the Principal Site.

4.3.15 Following the walkover surveys, the Scheme Boundary was reduced, and developable areas were set back from Middle Street to the east due to the proximity of the Scheme to the Area of Local Landscape Value. The Scheme was also set back from Springthorpe to the west, given the proximity to the

village; and from Fillingham to the south due to the proximity of the Scheme to the proposed Cottam Solar Project. This was an iterative process undertaken by the landscape led design team and was also in response to comments received at the non-statutory consultation events undertaken in July 2022. This reduced site area formed the basis of the EIA Scoping Report as shown in **PEI Report Volume III Figure 4-1**.

4.3.16 Following the above design work, the Principal Site as shown by the Scheme Boundary associated with the PEI Report (**PEI Report Volume III Figure 4-1**) has undergone further consideration in terms of setting out the parameters for the Scheme as set out in **PEI Report Volume I Chapter 3: Scheme Description**.

4.4 Alternative Technology

4.4.1 Other generation schemes such as wind power, nuclear, coal or gas fired power stations have not been assessed, due to their unsuitability for the Site (in the case of a large-scale wind project and nuclear energy) or inability to contribute to the UK's need for low carbon electricity (in the case of coal or gas).

4.5 Alternative Technical Specification

4.5.1 As described in **PEI Report Volume I Chapter 3: Scheme Description**, the parameters for the DCO will maintain some degree of design flexibility to allow the latest technology to be utilised at the time of construction. The ES however will consider the worst case scenario for the purposes of assessing potential impacts through the application of the Rochdale Envelope (see **PEI Report Volume I Chapter 5: EIA Methodology** for further details). Notwithstanding this, several technological design options have been considered and preferred options taken forward taking into consideration environmental effects, the Scheme's objectives and need for optimal functionality. Table 4-1 below summarises these design alternatives.

Table 4-1: Design Technology Alternative Specifications

Design Element	Considerations
Location and configuration of BESS	BESS are to be spread across the Scheme. The optimum location for these was considered and the preferred option is to locate these alongside the 140 solar stations. Due to the nature of the Scheme, a Direct Current (DC) coupled system is proposed, which means breaking up the BESS element and distributing smaller BESS across the Principal Site. This configuration minimises the energy losses due to cable length. An AC coupled system would result in a central location for the BESS station and additional components having a larger visual impact on that area, while also having increased cable losses and reduced roundtrip efficiency for the BESS, resulting in a smaller total power output for the Scheme. The Principal Site will contain up to 140 BESS stations which can be placed outside of visible areas where

Design Element	Considerations
	possible. Initial indicative locations at this stage have been chosen (shown on **PEI Report Volume III Figure 3-1**) based upon operational and technical requirements, such as minimising electrical losses due to length of cables, noise of the components and environmental protection zones. Currently, Lithium-Ion is the market leading technology for BESS installations due to availability and maturity of the technology. This will continue to be an open study until the DCO application is granted so as to ensure the most appropriate and up to date technology is considered.
Location and configuration of substations	Two substations are required for the Scheme. Five options were considered across the Principal Site taking into account access, planning, environmental and electrical engineering considerations. The two preferred locations following a site sifting exercise of the five sites is shown on the indicative layout (**PEI Report Volume III Figure 3-1**). The three other potential locations were dismissed following this appraisal.
Solar panel configuration	Two configurations were considered for the Solar PV layout at the scoping stage: fixed south facing and east-west trackers. It was concluded that east-west trackers were the preferred option as set out below. The distance between rows would typically be between 8m and 10m for south facing fixed panels and between 4.25m and 5m for east-west trackers. The row-to-row distance for the fixed structure is constant, being 3.57m at its smallest point, while it ranges between 3.4m and 1.87m for the tracker structure. Due to the nature of the tracker configuration, the average irradiation reaching the ground below the panels is much higher. The technology associated with east-west trackers has undergone significant advancement over recent years with this option now being feasible within the UK. The yield generated and therefore contribution to the UK renewable energy need of east-west trackers will be greater than fixed south-facing panels. The east-west trackers maximise the irradiance levels by continuously tracking the Sun's trajectory throughout the day. Approximately 6-15% more irradiation reaches the PV modules compared to the fixed south configuration, resulting in a similar increase for the power output of the plant when using east-west trackers. Throughout the Principal Site there are several environmental limitations, such as the hedges in-between the fields. Aforesaid limitations create physical constraints and generally restrict the developable area to irregular shapes. Non-rectangular shapes, or protrusions of the boundary have a considerably negative effect on the number of modules that can be installed using the fixed south facing structure as the modules must face south in

Design Element	Considerations
	order to maximise the energy output of the installation. However, east-west trackers can be aligned with the hedges, facing different azimuths as well as slightly off north and south in order to fit optimally within the irregular shapes of the fields, while still being able to face the sun directly through the tracking mechanism. Considering this, for east-west trackers the specific yield per installed capacity does not decrease, even so it is possible to install larger number of modules. Finally, the fixed south facing installation has a steeper energy output profile throughout the day, peaking at around 12:00-13:00, while it has significantly lower energy output during the peak demand hours in the morning and afternoon. On the other hand, east-west trackers have a smoother generation profile because the tracking mechanism maximises the generation during the highest irradiation hours and not just between 12:00 and 13:00, and this configuration can also start production earlier in the day and continue longer in the afternoon with higher efficiency compared to fixed south facing structure. In this way, the east-west trackers can match the load profile of the grid better than a fixed south facing installation. Considering the above-mentioned points, fixed south facing configuration will no longer assessed in the future revisions of the design and east-west tracker structure will be further developed.
PV array height	The maximum height for the fixed south configuration remains constant at 3.5m. As for the east-west tracker configuration this value moves between 2.5m and 3.5m, the latter happening only during dawn and dusk. The tracking configuration enables the panels to be positioned at lower angles and as such have lower visual impact compared to the fixed tilt, notwithstanding the potential glint and glare of the panels.
Foundation	Racks holding the solar PV panels are usually supported by galvanised steel poles and support structures/beams driven into the ground. This is the most common solution on existing UK solar parks and the preferred solution. This will be determined by ground conditions and environmental constraints such as archaeology. Other options include concrete footings, ground screws and ballast (either concrete or rubber). Associated infrastructure that will require foundations will include the substations and BESS/Solar Stations. The foundation design and depth will be informed by intrusive site investigations prior to the commencement of the Scheme. Therefore the ES will apply the Rochdale Envelope and assess the worst case scenario to ensure all potential impacts are considered whilst enabling flexibility to remain at this stage in terms of the foundation design. .

Design Element	Considerations
	The Scheme seeks to utilise existing farm tracks for access where possible, limiting the creation of new access roads. Some existing and new tracks may be required. These will need to comprise a suitable surface such as crushed stone for the vehicles that will use them with the potential need for the upgrading of existing tracks. A specification will be derived based upon the weight and type of vehicle and subject to the testing of the existing surface.

4.6 Alternative Layouts

4.6.1 The layout of the Scheme has evolved iteratively and will continue to evolve through the EIA process taking into consideration environmental effects, the Scheme's objectives and functionality, and feedback from stakeholders and public consultation.

4.6.2 The purpose of this section is to describe the alternative layouts considered for the Scheme to date. The Design and Access Statement, which will be submitted with the DCO application, will explain the evolution of the Scheme's design.

4.6.3 Table 4-2 summarises the main design layout iterations considered so far for the Scheme.

Table 4-2: Main design iterations for the Scheme

Stage	Proposed Layout	Consultation which influenced proposed layout	Design evolution
Design Freeze 1 – Spring 2022	Principal Site covering 2,700ha	This was prior to consultation with relevant stakeholders and so consultation did not influence the Scheme design at this stage.	The purpose of this design freeze was for the commencement of ecological surveys in Spring 2022 so consisted of land that had been assembled rather than any detailed design.
Landscape walkover survey (**PEI Report Volume III Figure 12-1**)	Principal Site covering 2,700ha	This was prior to consultation with relevant stakeholders and so consultation did not influence the Scheme design at this stage.	This assessment was completed to inform a reduction in the overall Principal Site area (for non-statutory consultation) based predominantly upon landscape considerations, but also other environmental considerations such as cultural heritage and PRoW.
Non-Statutory Consultation	Principal Site covering 1,700ha	This was prior to consultation with relevant stakeholders and so consultation did not influence the Scheme design at this stage.	Further environmental constraints and opportunities mapping and planning considerations were taken into account in refining the land expected to be required for the Scheme. This information was presented at the non-statutory consultation.
EIA Scoping Layout (Design Freeze 2) (**PEI Report Volume III Figure 4-1**)	Principal Site reduced to approximately 1,400ha	Following further site visits, meetings held with the occupiers of neighbouring properties and in response to non-statutory consultation events held in July 2022.	Scheme Boundary reduced to approximately 1,400ha for the Principal Site. Key changes were: • Land to the west of Springthorpe removed due to concerns raised by local landowners and ecological advice. • Land to the east of Springthorpe was removed to have regard to comments made by the parish council at the non-statutory consultation event and at a

Stage	Proposed Layout	Consultation which influenced proposed layout	Design evolution
			subsequent meeting. This was also to have regard to the proximity of a byway and temporary permissive bridleway located to the east of Springthorpe. • To take account views of Middle Street (The Cliff) The developable areas were pulled in from the east away from Middle Street (The Cliff) to have regard to views and the setting of Glentworth. • The Scheme boundary was pulled in from the south having regard to the setting of Fillingham and Middle Street (The Cliff).
PEI Report (Design Freeze 3) (**PEI Report Volume III Figure 3-1**)	Indicative layout covering approximately 1,400 ha	EIA Scoping Opinion Non statutory consultation feedback Discussions with landowners	• Land pulled back further from Springthorpe. • Land discounted in the north-eastern corner of the Principal Site to avoid the use of ALC Grade 3a land and pulling the Scheme further from a Scheduled Monument - Harpswell Hall – (NHLE 1019068). • Consideration of: Solar PV design including BESS and Solar Stations, electrical engineering design for the grid connection works including the location of two no. sub-stations, outline fire safety strategy, primary and secondary access roads and the provision of green infrastructure.

4.7 Alternative Cable Route Corridors

4.7.1 An optioneering process has been undertaken to identify the Cable Route Corridor for the Scheme to connect to the National Grid Cottam Substation.

4.7.2 As described in **PEI Report Volume I Chapter 3: Scheme Description**, the electricity generated by the Scheme is to be imported and exported via interface cables from the onsite substations. The Cable Route Corridor therefore needs to connect the substations to one another; and connect to the National Grid Cottam Substation.

4.7.3 The Cable Route Corridor associated with the Scheme at EIA Scoping stage has been reduced. This is to aid in facilitating the potential to deliver a shared corridor with the other developers of neighbouring solar schemes within the local area (Low Carbon (Gate Burton Energy Park) and Island Green Power (West Burton and Cottam Solar projects)) whilst being wide enough to ensure that all schemes can still proceed. In reducing the Scheme Boundary, the design criteria listed below has been considered within the overall Scheme Boundary of the Cable Route Corridor. This will inform further optioneering work following the PEI Report and statutory consultation to optimise the location of the cable route itself for the Scheme.

4.7.4 At the EIA Scoping stage, a preferred Cable Route Corridor and an alternative Cable Route Corridor was shown. The alternative Cable Route Corridor was to direct the route to the north of Willingham-by-Stow. This alternative route has been removed as an option due to the potential to route share with other neighbouring schemes. As such the focus of more detailed design work is on land to the south of Willingham-by-Stow. This will facilitate the opportunity for the sharing of the corridor with other developers.

4.7.5 Table 4-3 below sets out the key design considerations and technical inputs that will inform further iteration of specific cable route options as the design of the Scheme progresses.

Table 4-3: Design considerations for the Cable Route Corridor

Criteria	Consideration
Technical and engineering requirements	Including: • Optimising routing so the cable can be laid in a straight line or in shallow curves so that the cable can be pulled through the ducting efficiently. • Space for jointing bays and pits. • Working area for cable trenching. • Areas of working (e.g. pits and construction compounds) for road, rail and river/watercourse crossings. • Boring, micro-tunnelling or moling requirements – impacts on hydrology and watercourses and needing to adhere to the Environment Agency's

Criteria	Consideration
	specific guidance on watercourse crossings and impacts on Network Rails assets. • Access to the route.
Planning policy and Environmental Constraints	Including: • Proximity to residential property. • Avoidance of national ecological designations. • Avoidance of national cultural heritage designations. • Proximity to local ecological designations and sensitive ecological receptors. • Proximity to PRoW. • Flood risk. • Sensitivity of watercourse crossings. • Proximity to woodland. • Potential impacts associated with minerals and waste. • Consideration of planning allocations and planning history. • Minimisation of potential disruption.
Land use Constraints	Utilising a shared corridor will result in affecting a minimum number of landowners. Minimising possible disturbance for the landowner when farming or using land for other purposes. Where possible reducing interaction on rail network or strategic road infrastructure, utilities and other infrastructure.
Collaborative Working with neighbouring solar farms to explore the opportunity to use a shared corridor with other developers of solar projects within the area that are also seeking to make a connection to National Grid Cottam Substation.	Understanding the extent of the Cable Route Corridors associated with these projects and how these might be able to sit alongside a route for the Scheme ensuring that all routes can be brought forward with the least amount of environmental, social and economic impacts.

4.7.6 Following the above exercise, the Cable Route Corridor will be refined further prior to preparation of the ES stage of the EIA. Further consultation with nearby developers and comments made at statutory consultation will be considered, as well as baseline studies and survey work.

4.8 References

Ref. 4-1. HMSO (2017). Infrastructure Planning (Environmental Impact Assessment) Regulations 2017

Ref. 4-2. Department of Energy and Climate Change (DECC) (2011). Overarching National Policy Statement for Energy (EN-1).

Ref. 4-3. Department for Energy Security and Net Zero (2023) Draft Overarching National Policy Statement for Energy (EN-1).

Ref. 4-4. Planning Inspectorate (2020) Advice Note 7: EIA: Process, Preliminary Environmental Information and Environmental Statements.

Ref. 4-5. Department for Energy Security and Net Zero (2023) Draft National Policy Statement for Renewable Energy (EN-3).

Ref. 4-6. Department for Energy Security and Net Zero (2020) the Ten Point Plan for a Green Industrial Revolution

Ref. 4-7. Department for Energy Security and Net Zero (2021) Net Zero Strategy: Build Back Greener

Ref. 4-8. Department for Energy Security and Net Zero (2022) British Energy Security Strategy

Ref. 4-9. HMSO (2008). The Climate Change Act 2008.

Ref. 4-10. UN (2015) Paris Agreement

Ref. 4-11. CCC (2019). Net-Zero: The UK's contribution to stopping global warming.

Ref. 4-12. HMSO (2019) The Climate Change Act 2008 (2050 Target Amendment) Order 2019

Ref. 4-13. HM Government (2020) Energy white paper: Powering our net zero future.

Ref. 4-14. IPCC (2018). Global Warming of 1.5°C. *An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.*